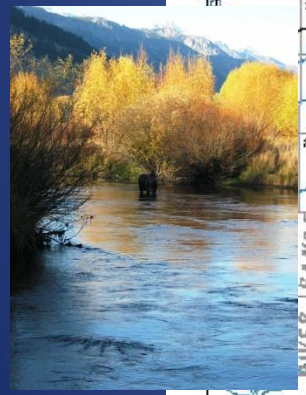
Evaluation of Nutrient Inputs into Fish Creek, Teton County, Wyoming

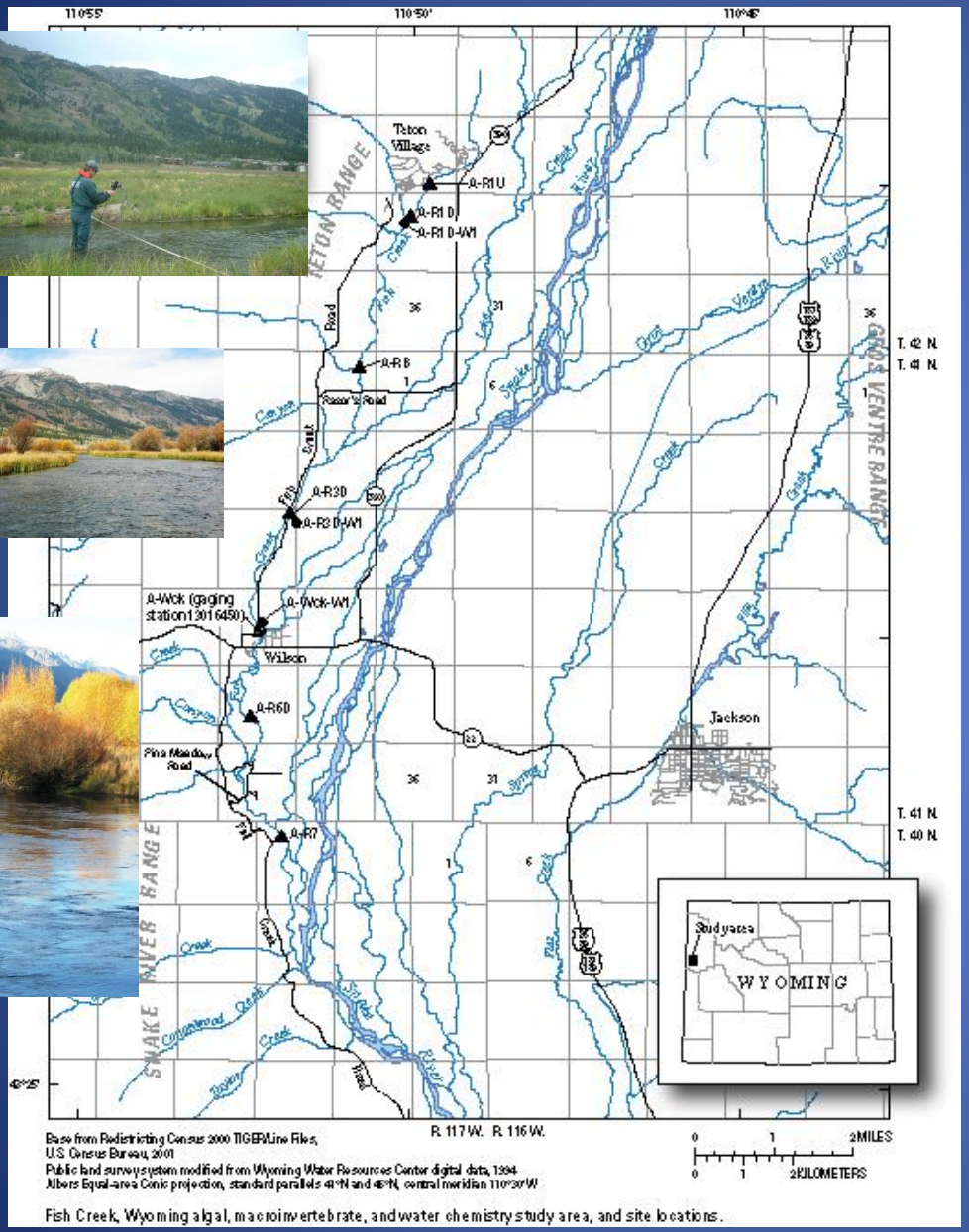
Cheryl Eddy Miller

U.S. Geological Survey

USGS

Teton Conservation District Est. 1946





Fish Creek, Wyoming algal, macroinvertebrate, and water chemistry study area, and site locations.

Fish Creek

- Snake River tributary on western side of Jackson Hole
- Critical Snake River Cutthroat habitat
- Average summer flows range:
  - 4 cfs, Teton Village
  - >500 cfs, Wilson

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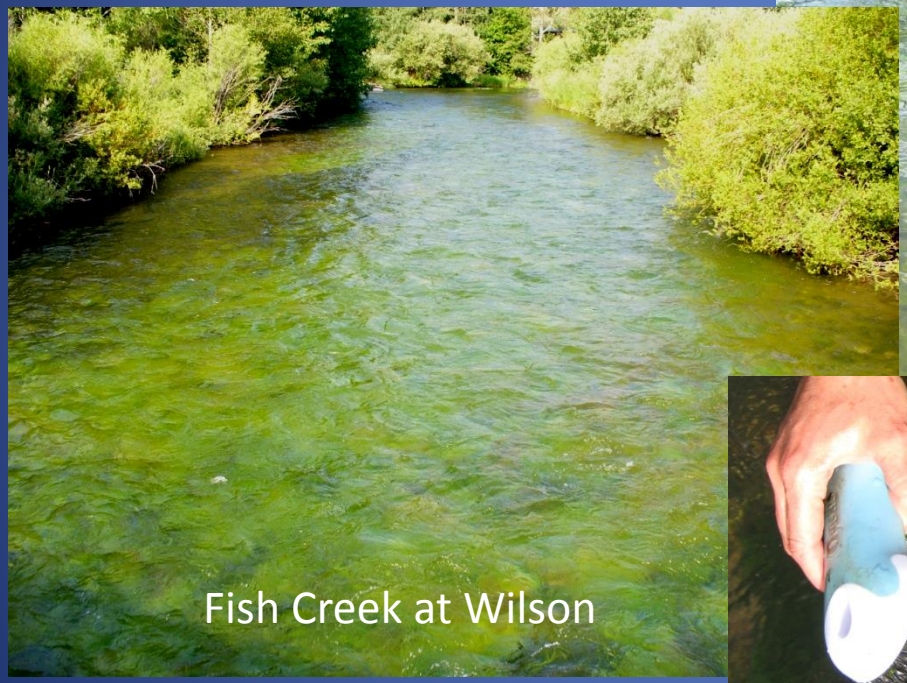
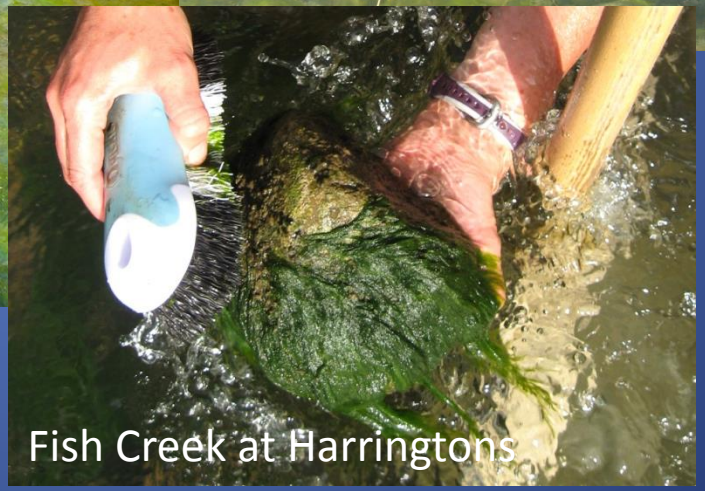
Why it all began

- 1990s, residents began noting excessive algal growth


Fish Creek at Crescent H


Fish Creek at Wilson


Fish Creek at Harringtons

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First step: Characterize Hydrology

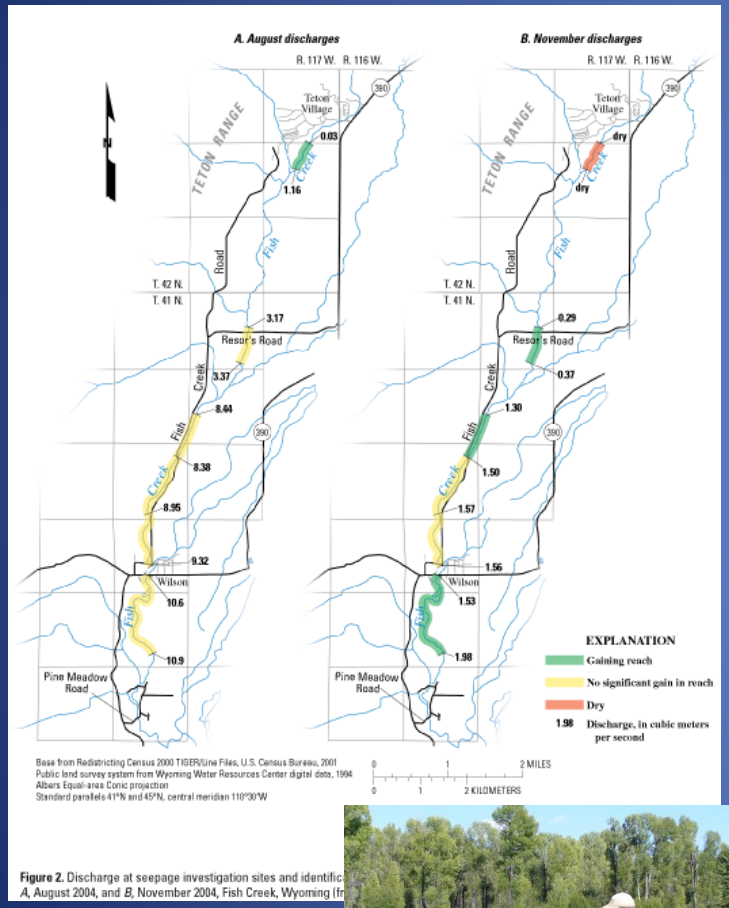
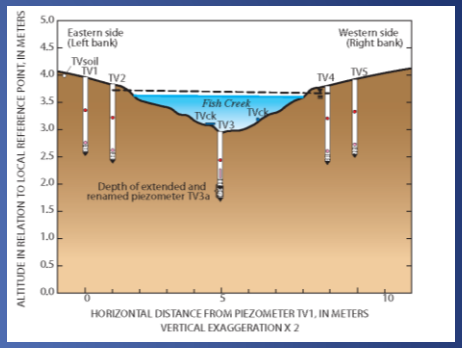
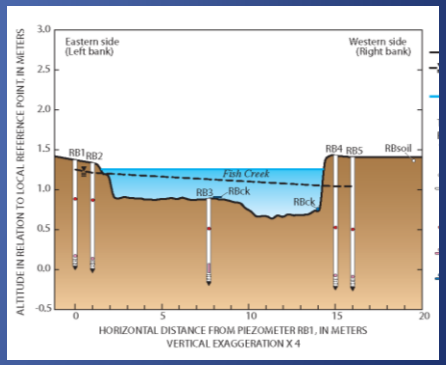
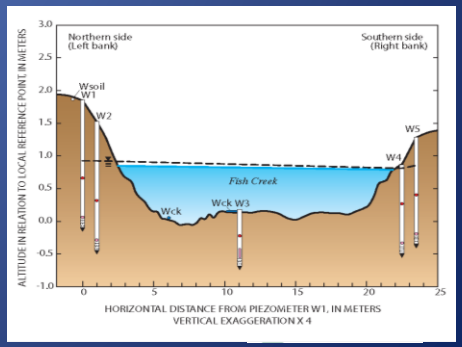


Figure 2. Discharge at seepage investigation sites and identific
A, August 2004, and *B*, November 2004, Fish Creek, Wyoming [fr

- Previous samples gave us no evidence that it was a nutrient issue







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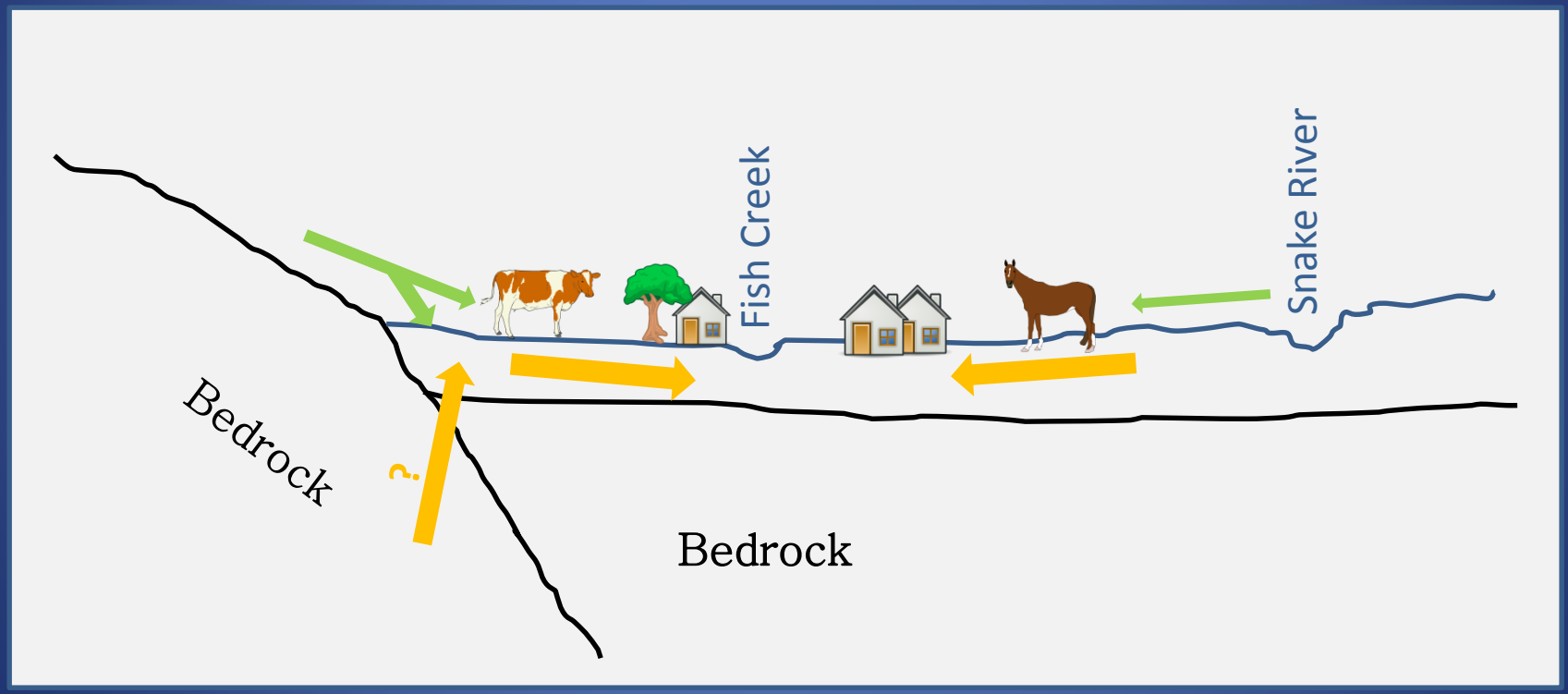
Generalized Hydrology



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Second step: Describe Water Quality and Aquatic Biology

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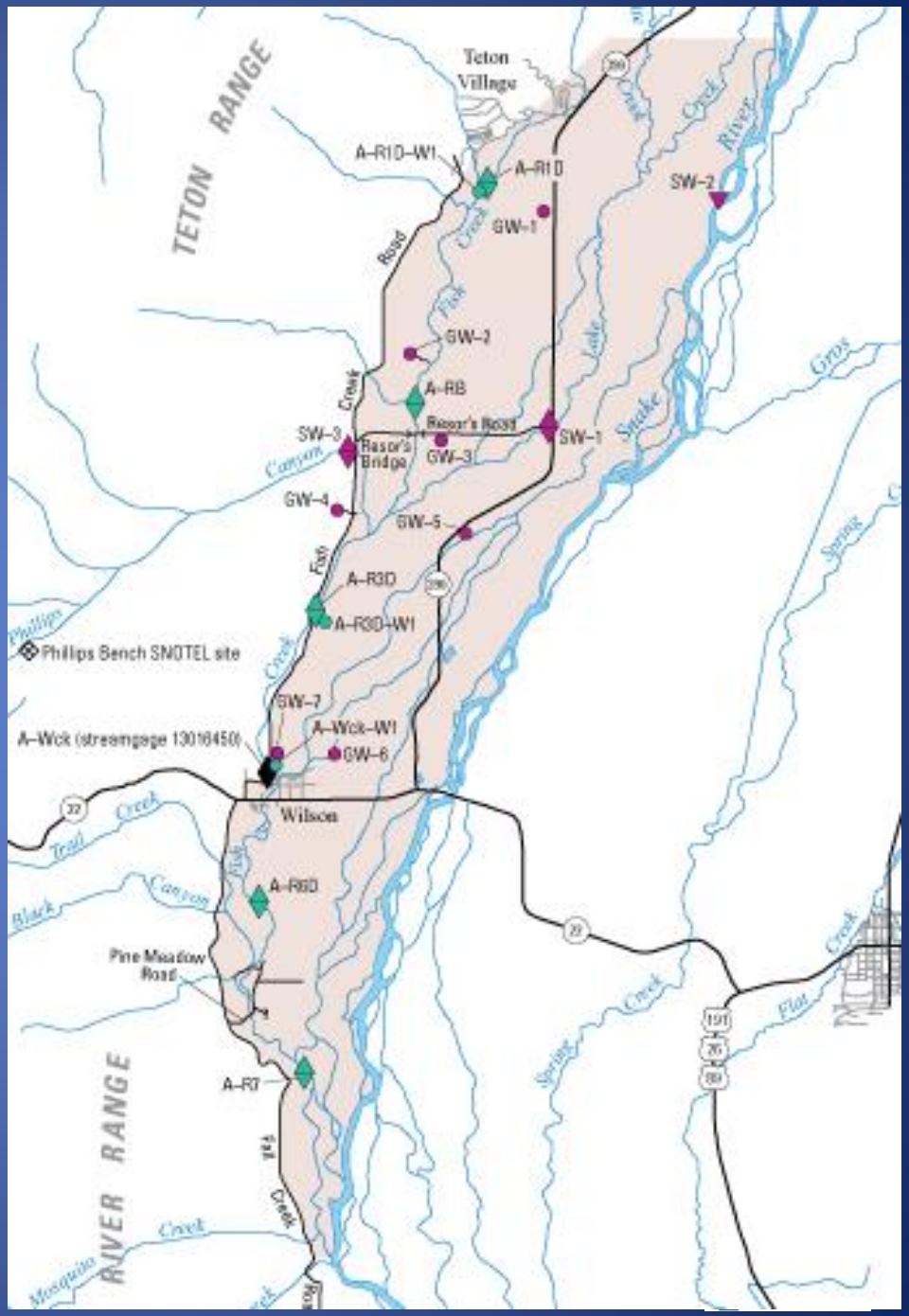
Water-Quality and Biological Data

- Sites established from Teton Village to Crescent H Ranch



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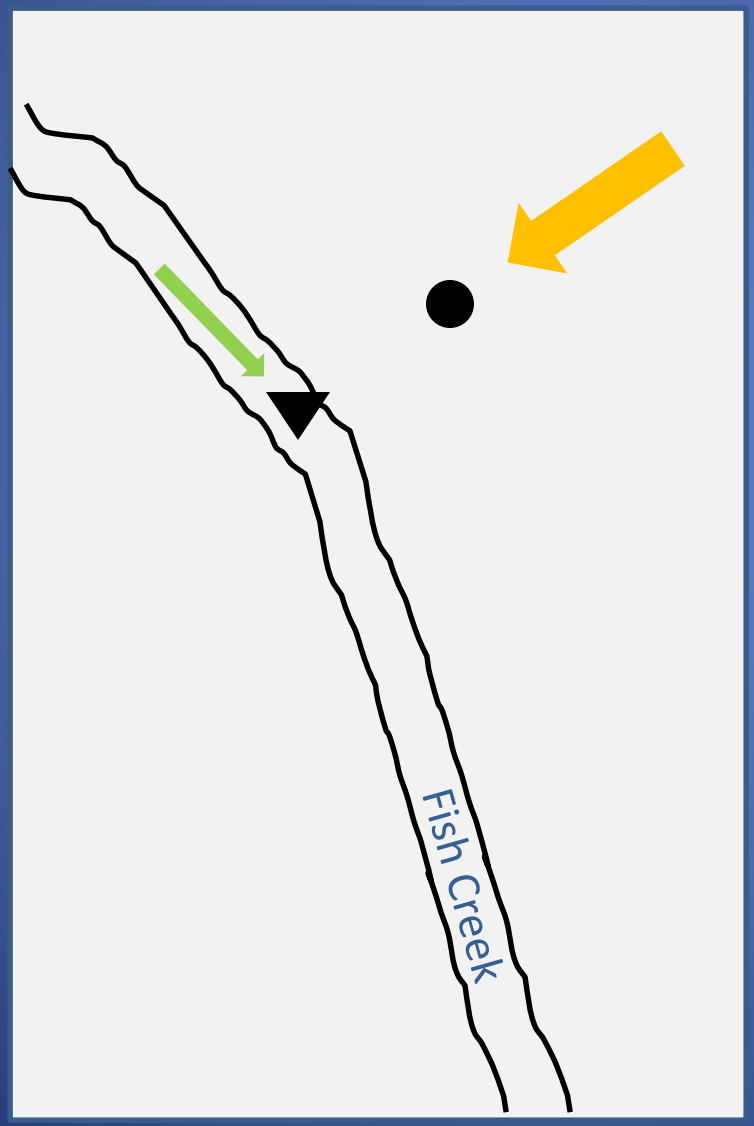
Water Quality



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Algal Growth

- Chlorophyll-*a*: much higher than surrounding streams. MT standards
- Taxonomy shows shift from microalgae to macroalgae

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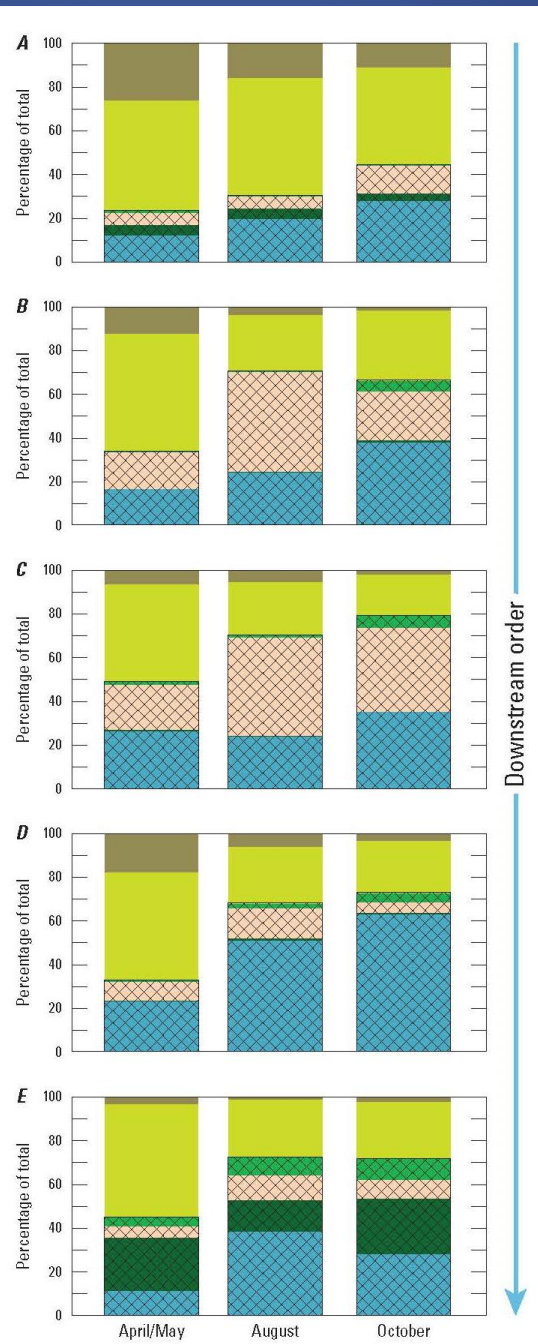
Macrophyte Growth

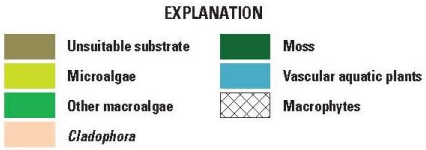
- Not just algae
- Chlorophyll-*a* doesn't describe whole picture
- Large increase in crop in August and October



Cladophora at site A–R3D, August 2008.

Vascular aquatic plants at site A–R6D, October 2008.

Moss at site A–R7, May 2008.



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Aquatic Biology

- Change in algae/moss/vascular aquatic plants affecting macroinvertebrate
- Compared to other creeks – not just life cycle

Fish Creek at Wilson, April/May

Fish Creek North of Wilson, August

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Water Quality

- Nutrients (Nitrogen and Phosphorus)
  - Nitrate and Orthophosphate dominant species
  - Low in surface water in particular August and October (non-detects).
  - Higher in groundwater (10x)

Statistically significant inverse relationship between low N and high macrophyte growth

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Possible Nutrient Sources

- Septic systems
- Sewage treatment discharges
- Fertilizer (urban lawns)
- Fertilizer (golf courses and parks)
- Fertilizer (miscellaneous fields)
- Atmospheric deposition
- Surface-water diversions into Fish Creek
- Livestock
- Avalanche explosives

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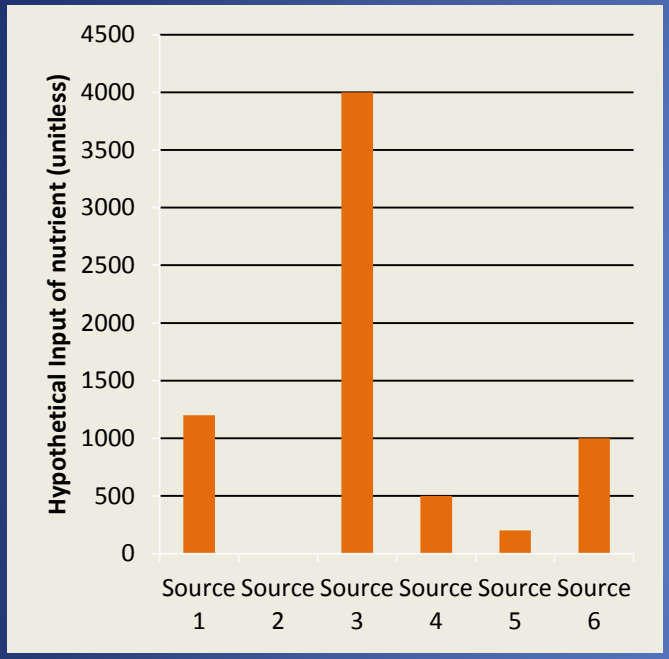
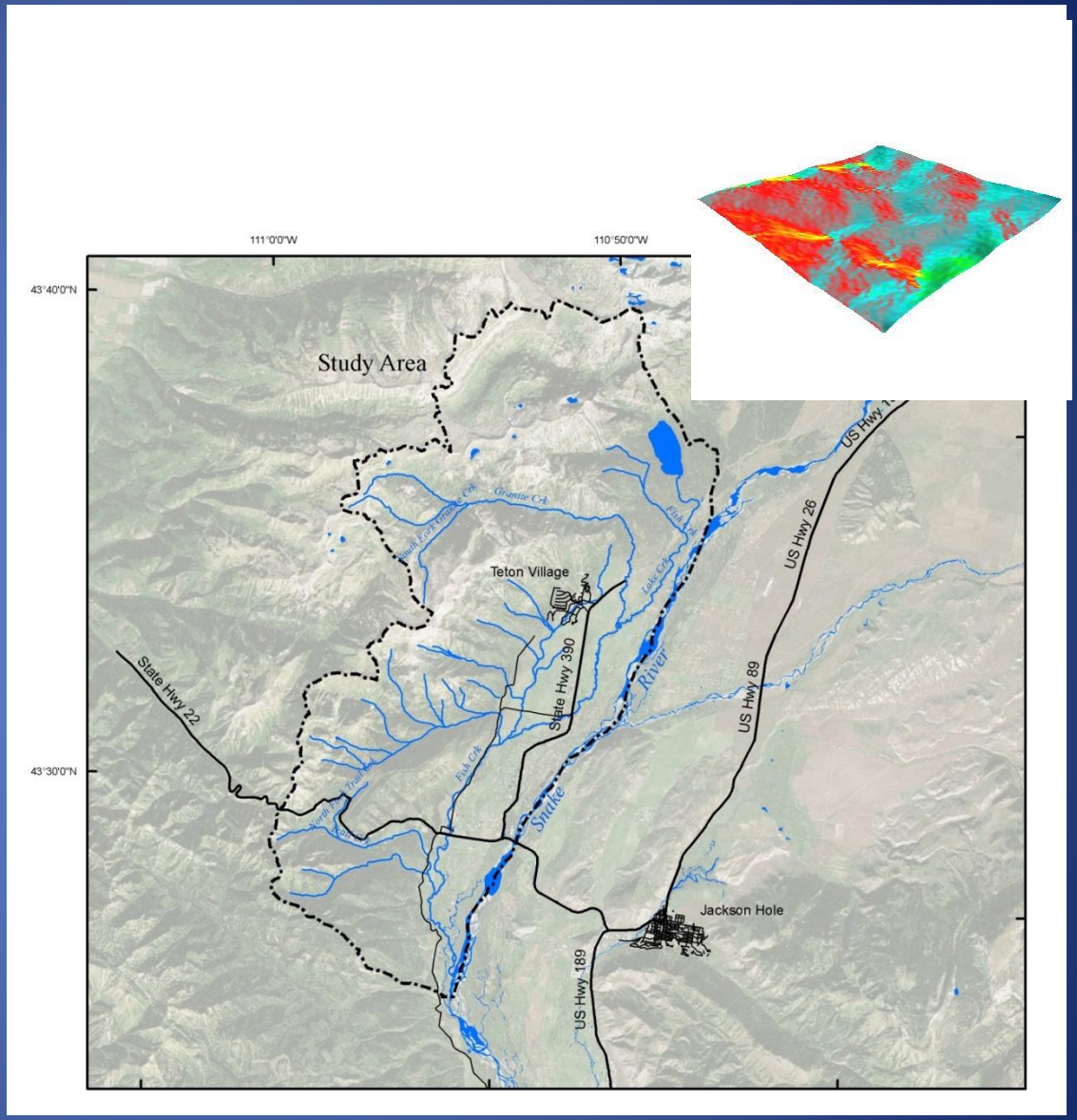
Current Work



- Understanding of contribution from each source



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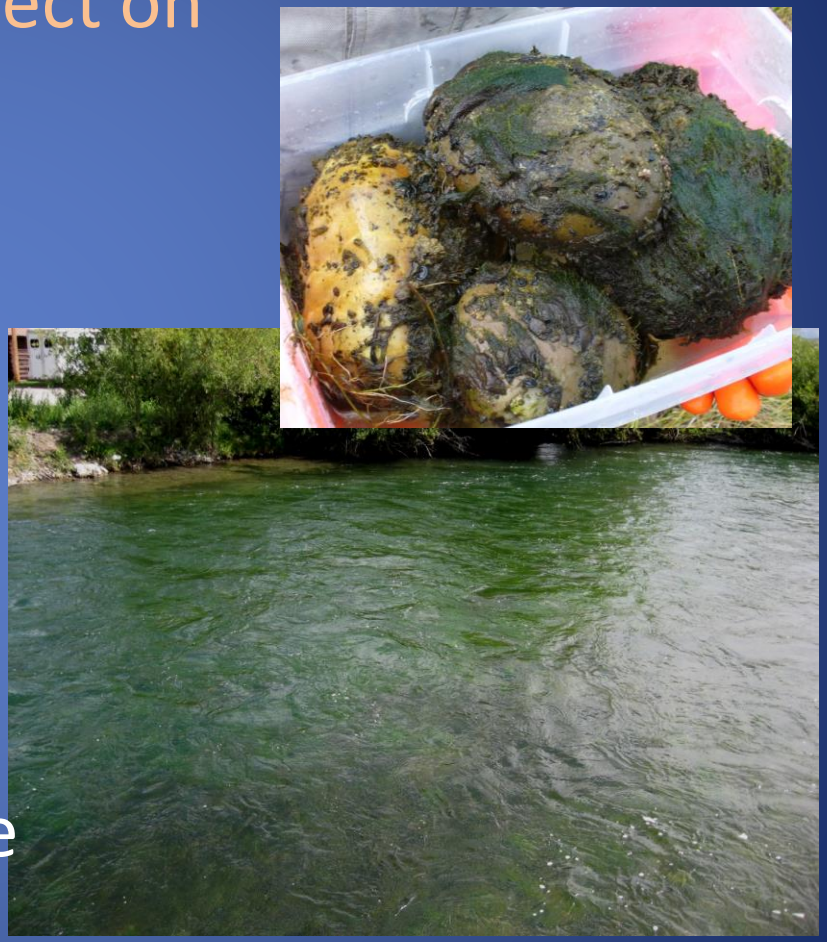
Summary

- Hydrology has a large effect on the water quality
- Stream samples for nutrients didn't explain condition on their own
- Chlorophyll-a can be useful parameter
- Even if water quality appears acceptable, inputs can be having an effect (macroinvertebrate populations)



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